

75th MORSS 712CD Cover Page

12-14 June 2007, at US Naval Academy, Annapolis, MD

If you would like your presentation included in the 75th MORSS Final Report CD it must:

1. Be unclassified, approved for public release, distribution unlimited, and is exempt from US export licensing and other export approvals including the International Traffic in Arms Regulations (22CFR120 et.seq.),
2. include MORSS Form 712CD as the first page of the presentation and
3. a MORSS form 712 A or B must be in the MORSS Office no later than **14 June 2007**.

Author Request (To be completed by applicant) - The following author(s) request authority to disclose the following presentation in the MORSS Final Report, for inclusion on the MORSS CD and/or posting on the MORSS web site.

Name of Principal Author: Mr. Jeff E. Edwards / Mr. Kevin Wainer

Principal Author's Organization and address:
USA TRADOC Analysis Center – WSMR,
Soldier & Systems Analysis Directorate,
White Sands Missile Range, NM 88002

Phone: 505-678-8046 Email: eddie.edwards1@us.army.mil

Original title on 712 A/B: LW / MW DOTMLPF Assessment

Presented in: WG # 26

The following presentation is believed to be: unclassified, approved for public release, distribution unlimited, and is exempt from US export licensing and other export approvals including the International Traffic in Arms Regulations (22CFR120 et.seq.)

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 01 JUN 2007		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE Land Warrior (LW)/Mounted Warrior (MW) DOTMLPF* Assessment				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) USA TRADOC Analysis Center WSMR, Soldier & Systems Analysis Directorate, White Sands Missile Range, NM 88002				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES See also ADM202526. Military Operations Research Society Symposium (75th) Held in Annapolis, Maryland on June 12-14, 2007, The original document contains color images.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 16	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Land Warrior (LW)/Mounted Warrior (MW) DOTMLPF* Assessment



**Briefing to 75th MORSS WG 26
June 2007**

*Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities

Purpose and Agenda

Purpose

To discuss the unique aspects of the LW/MW DOTMLPF Assessment conducted in support of a Milestone C Decision.

Agenda

- System Description.
- Background.
- Analytical Organization.
- Timeline.
- Process.
- Limited Users Test (LUT).
- Lethality Experiment.
- Navigation Experiment.
- LW Modeling Representation.
- COMBAT^{XXI} Platoon Attack Scenario.
- Summary.

System Description

Land Warrior Ensemble



- All features are integrated by the LW computer.
- System weight: 15.83 pounds (with one battery).

Mounted Warrior Ensemble



HMD views available to crews



FBCB2

RWS sight

DVE

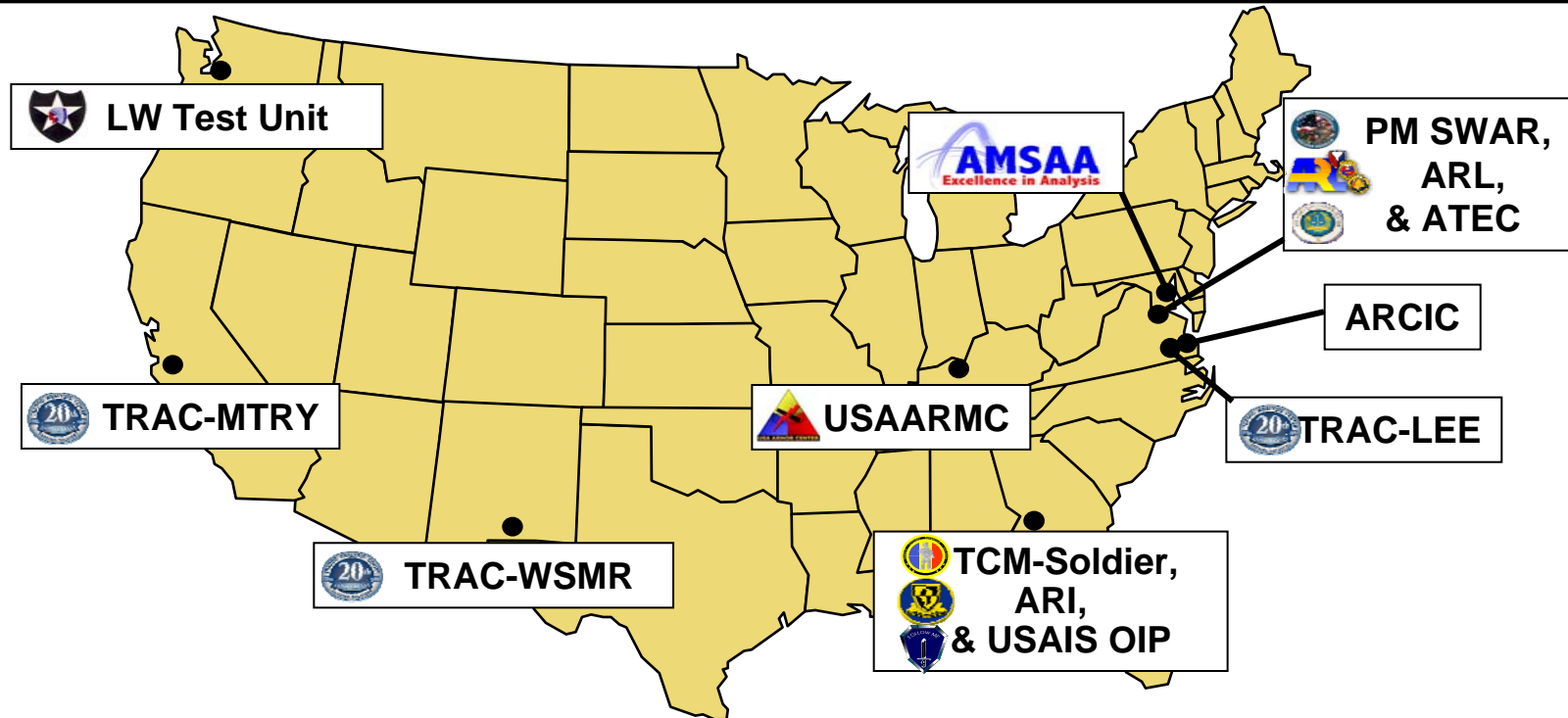
LW Provided Capabilities:

- Orders (Develop/Send, Receive, Modify).
- Graphics (Develop/Send, Receive, Modify).
- Images (View/Capture/Save/Send Digital Images).
- Situational Awareness.
- Messaging (Call for Medic, Call for Fire, SALUTE, Text).
- Navigation.
- Voice Communications.
- Reduced Exposure Fire (REF).
- Zoom (Digital Observation - Wide, Narrow, and Zoom).

Background

- 1994: LW passed an MS I/II review.
- 1995 – 2003: LW technological improvements provided the means for the system to perform as intended.
- 2004: The VCSA approved equipping one Stryker battalion with LW and MW to conduct a DOTMLPF assessment.
- 2005: Changes in the LW program required the scheduling of an MS C decision.
- February 2006: TRADOC issued LW/MW DOTMLPF Assessment directive that:
 - Identified USAIC as the assessment lead.
 - Identified TRAC as the analytic lead.
 - Established an integrated process team (IPT) to provide oversight.
 - Synchronized the limited user test (LUT), scheduled for September 2006, to coincide with the LW/MW DOTMLPF Assessment.
 - Identified two LW BOIP alternatives:
 - Full LW = 37 LW ensembles per line platoon.
 - Limited LW = 17 LW ensembles per line platoon.
- May 2006 – February 2007: Executed LW/MW DOTMLPF Assessment.

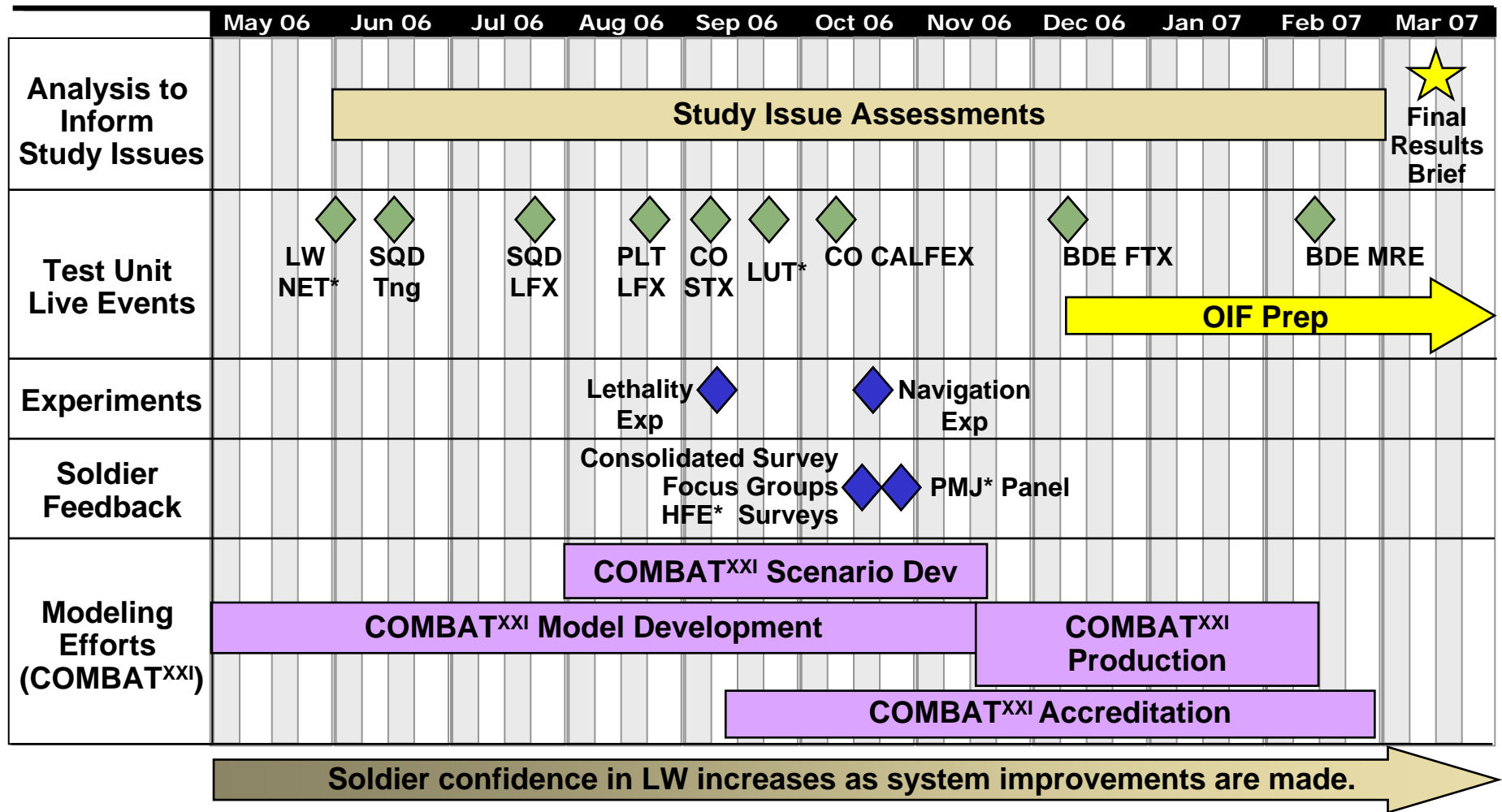
Analytical Organization



- Expertise was sought out through many agencies across the nation to inform the assessment.
- This assessment was divided into four study issues:
 - 1) What is the force effectiveness (FE) of a Stryker platoon when equipped with each LW BOIP alternative?
 - 2) What are the DOTMLPF impacts of equipping a Stryker battalion with MW and LW?
 - 3) What is the estimated life cycle cost (LCC) of each LW BOIP alternative?
 - 4) How well do MW and LW mitigate the 19 small unit capability gaps?

Coordinating experimentation, simulation, and analysis among geographically dispersed agencies provided unique challenges to the overall process.

Timeline

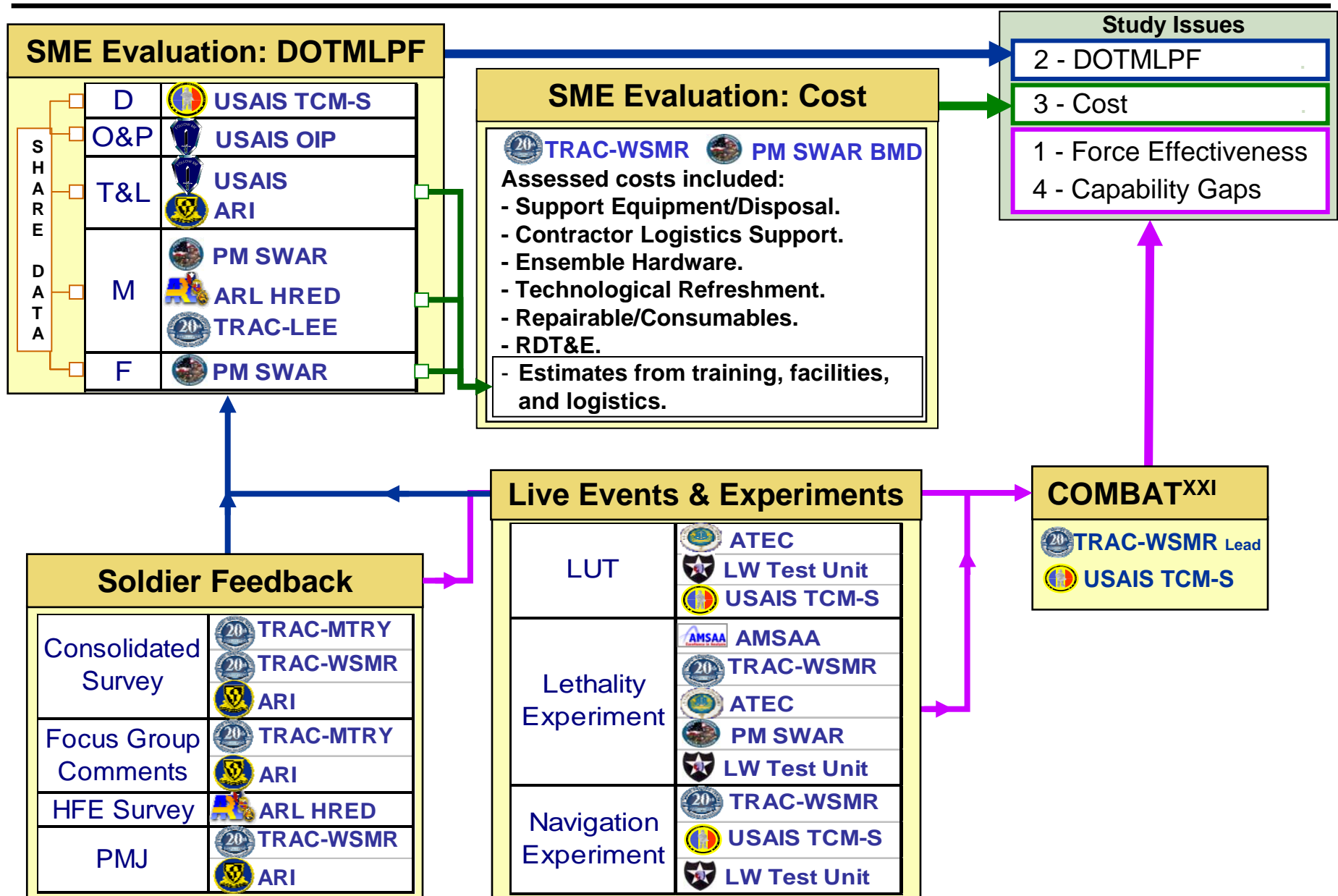


New equipment training, technology refinement, testing, and analysis occurred simultaneously with the test unit's preparation for war.

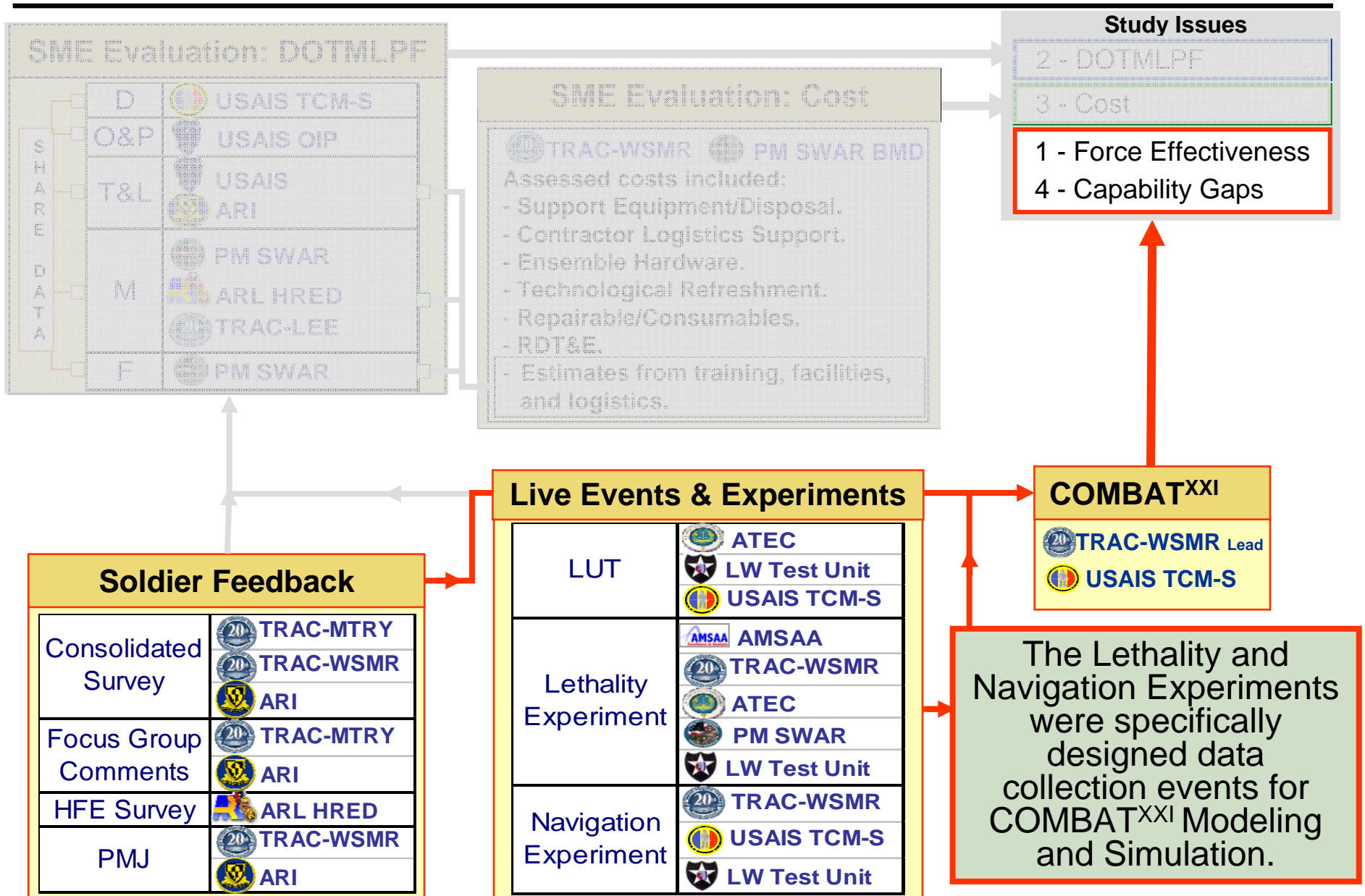
* LW NET: Land Warrior New Equipment Training
HFE: Human Factors Engineering

LUT: Limited Users Test
PMJ: Professional Military Judgment

Process



Process



Limited Users Test (LUT)

Limited Users Test (LUT)

Sep to Oct 06 – Fort Lewis, WA

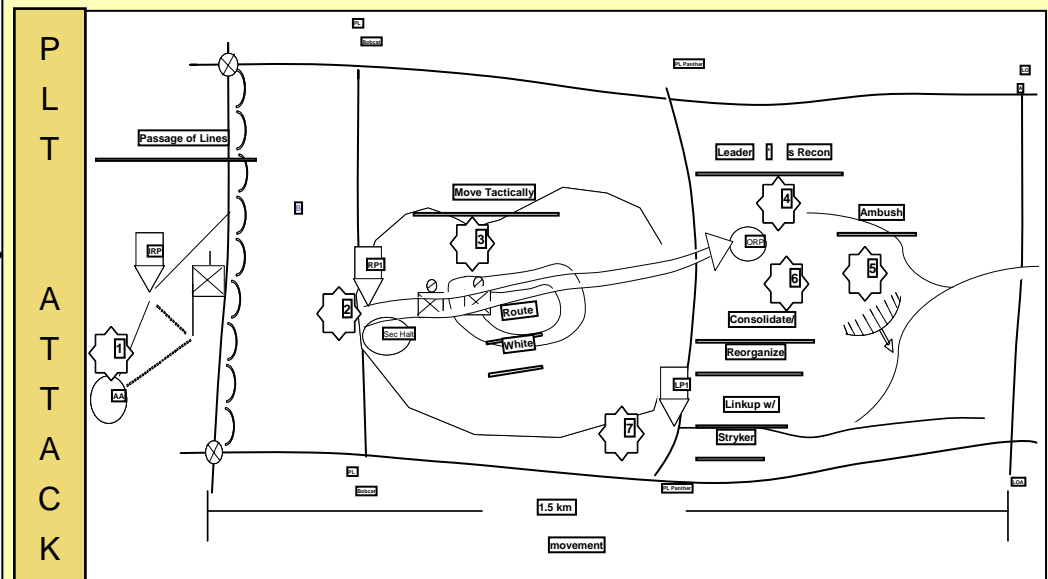
 ATEC  USAIS TCM-S  LW Test Unit



- Overseen by ATEC.
- One company from Test Unit.
- Utilized scenario conducted in a live environment using LW against a trained and validated threat.

COMBAT^{XXI} Scenario Development

- Changes to techniques and procedures as a result of LW were modeled into COMBAT^{XXI}.



- COMBAT^{XXI} data:
 - Friendly and Threat force disposition.
 - Scheme of maneuver.
 - TTPs.

LW LUT provided information for the first scenario that was incorporated into the COMBAT^{XXI} model.

Lethality Experiment

Lethality Experiment Sep 06 – Fort Lewis, WA



Evaluated accuracy from
three firing positions:



REF

Reduced
Exposure Fire
Position



DREF

Defensive
Reduced
Exposure Fire
Position

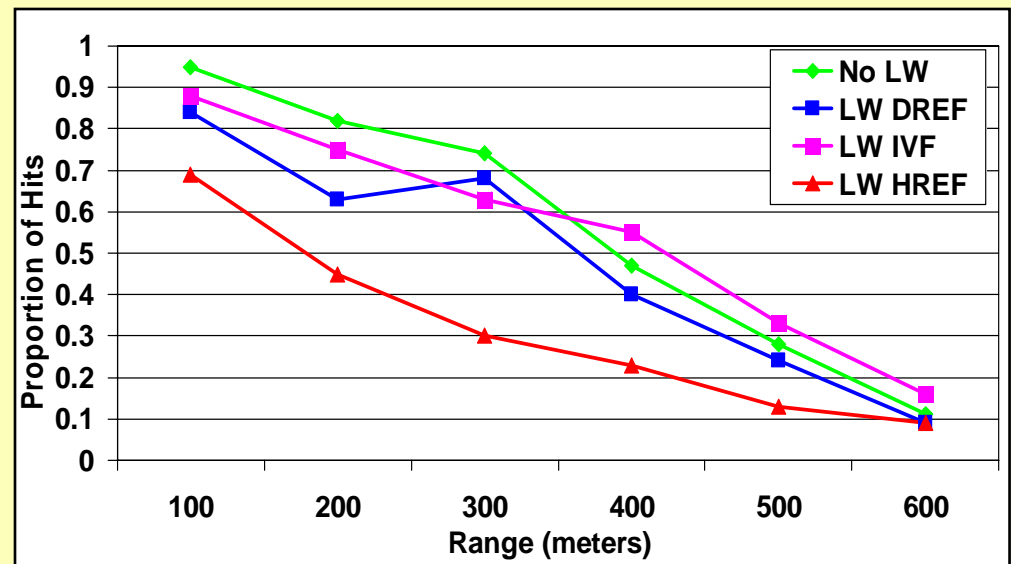


IVF

Indirect View
Fire Position

COMBAT^{XXI} Scenario Development

- Performance data for M4, M203, and M249 was collected and processed.





- LW data modeled into COMBAT^{XXI}.
 - % Hit (REF, DREF, IVF).
 - Time to engage (REF, DREF, IVF).

Comprehensive accuracy data gathered during the Lethality Experiment was incorporated into the COMBAT^{XXI} model.

Navigation Experiment

Navigation Experiment

Oct 06 – Fort Lewis, WA

 USAIS TCM-S  LW Test Unit

 TRAC-WSMR

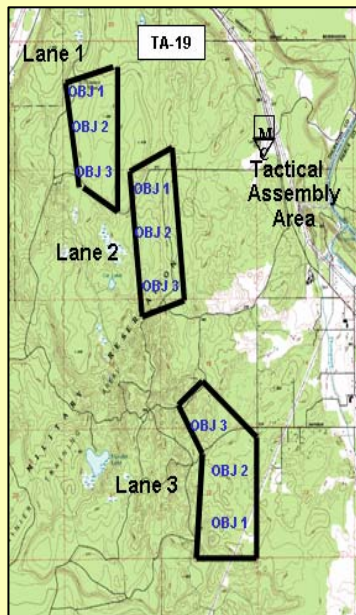
Three missions per Lane:

OBJ 1: Find a weapons cache.

OBJ 2: Conduct squad attack.

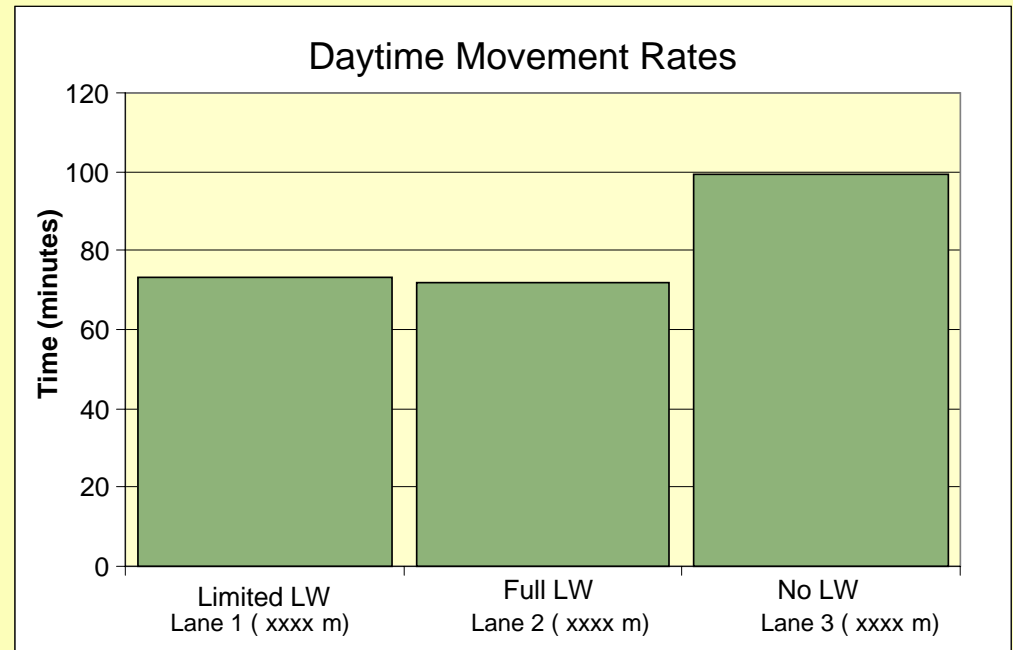
OBJ 3: Conduct an ambush.

- 1 squad / lane.
- Squads rotated LW BOIP alts (and No LW) between lanes:
 - L1: Limited LW
 - L2: Full LW
 - L3: No LW
- Daytime and nighttime.



COMBAT^{XXI} Scenario Development

- Day/night movement rates were computed using the distances covered by the times recorded.



- No LW, Limited LW, and Full LW movement rates ensured proper representation of the added navigation capability.

LW movement rates from the Navigation Experiment were incorporated into the COMBAT^{XXI} model.

LW Modeling Representation

LW Hardware	LW Capability		Model Representation
<ul style="list-style-type: none"> • Helmet Mounted Display • Headset and Microphone • Soldier Control Unit • EPLRS Radio • Computer Subsystem • Daylight Video Sight • Weapon Subsystem 	Data Transfer	• Orders and Graphics	Not modeled.
		• Friendly Force Tracking • Threat Force Tracking	<ul style="list-style-type: none"> • Explicitly modeled transfer of information. • Implicitly modeled resultant improved SA. <ul style="list-style-type: none"> – Different TTPs. – Entity decision logic.
		• Digital Call for Fire	Implicitly modeled through time penalties (from time of call to time of effect).
		• Digital Call for Medic	Explicitly modeled (point to point).
	Enhanced Land Navigation		Speed: Explicitly modeled through movement rates. Navigate: Implicitly modeled through time penalties.
	Improved Voice Communications		Explicitly modeled.
	Enhanced Target Location		Implicitly modeled through reduced TLE.
	Reduced Exposure Fire		Explicitly modeled through data and logic.
	Digital Optics		Explicitly modeled through data and logic.

COMBAT^{XXI} M&S represented LW [capabilities](#), not hardware.

COMBAT^{XXI} Platoon Attack Scenario

Platoon conducts deliberate attack of OBJ to destroy Threat conducting IED resupply.

Phase I: Reconnaissance of objective.

Phase II: Attack position occupation.

Phase III: Assault of objective.

LUT

- Scenario
- Schemes of maneuver
- Techniques
- Procedures

Lethality Experiment

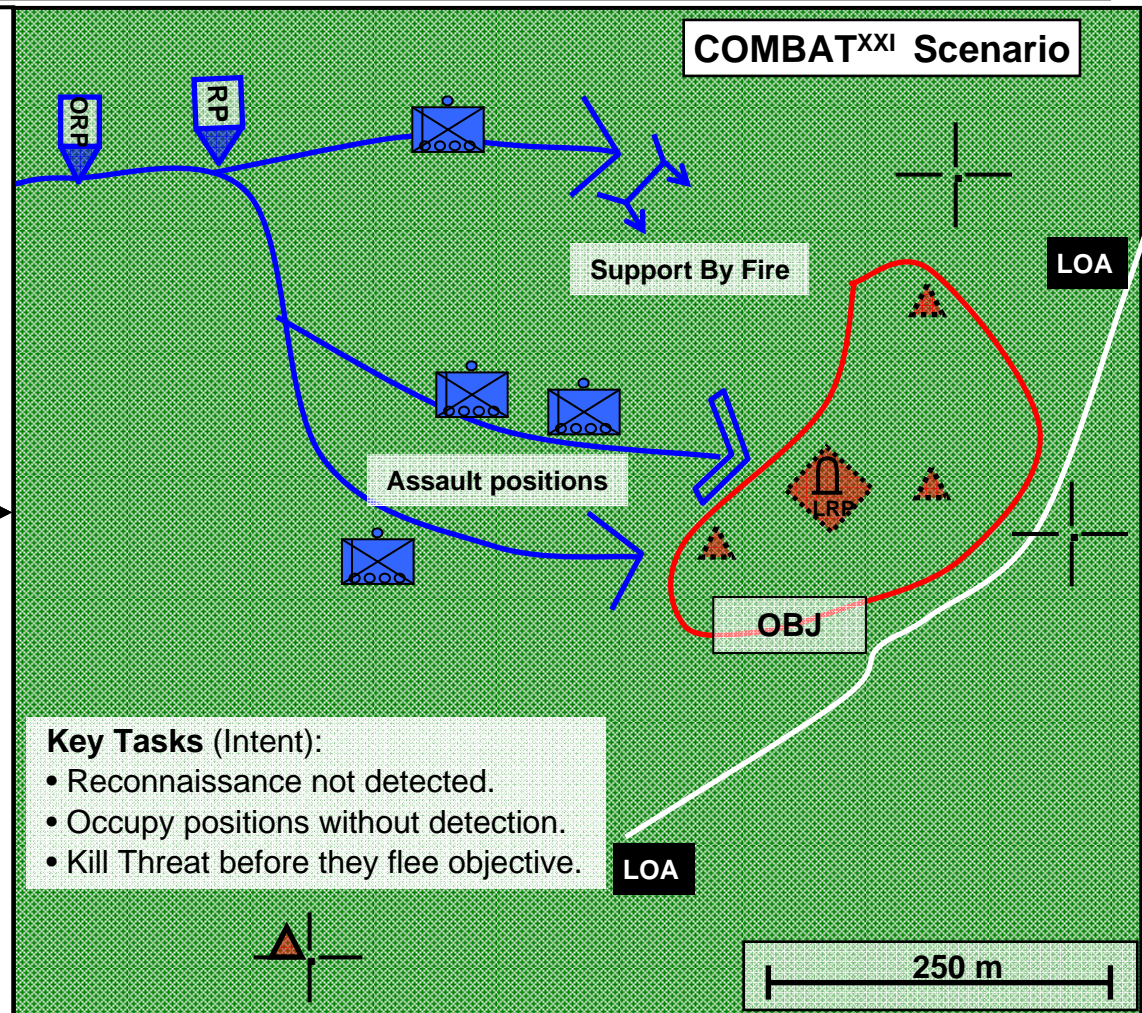
REF Accuracy Data:

- M4
- M203
- M249

Navigation Experiment

Movement Rates:

- Day
- Night



Scenario evaluated as platoon used No LW, Limited LW, and Full LW.

The unique opportunities to acquire data ensured the fidelity of the COMBAT^{XXI} representation of LW's added capabilities.

Summary

The LW/MW DOTMLPF Assessment was unique due to the:

- Size of the team organization, which capitalized on the expertise of many agencies and personnel.
 - Requires clear and distinctive objectives for participating agencies.
- Quick development and execution of experiments that ran alongside the unit's preparation for a wartime deployment.
 - Requires ability to establish and enforce clear protocols for development of the plan and execution of the study.
- First use of COMBAT^{XXI} in support of a Major Defense Acquisition Program.
- New equipment training, technology refinement, testing, and analysis occurred simultaneously.
- Direct access to the LW Test Unit, which provided a unique data collection opportunity.

The LW/MW DOTMLPF Assessment was a successful merging of multiple efforts and expertise at a pace necessary to meet the needs of the Soldier.

Questions?